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Minicourse 1, a short microteaching program designed to change 12 specific classroom behaviors involved in conducting a discussion lesson, relies heavily on filmed illustrations by model teachers and provides feedback through carefully structured teacher self-evaluation of televised lesson replays. A study was designed (1) to estimate the degree to which practice in the microteaching format and feedback from the video tape replay influenced learning in the minicourse model and (2) to determine the effectiveness of the minicourse as a technique for changing the behavior of student teachers. Five groups of 15 to 17 student teachers from three teacher training institutions were subjects of the study. No variables appeared to influence their assignment to groups: three groups completed the entire minicourse, one was given all but the video tape recordings and replay, and one did no microteaching and received no feedback. Behavior change was measured by trained raters who scored coded 16-minute pre- and postcourse video tapes of each student teaching his entire class. The three research hypotheses were tested using a one-tailed t-test; all three were supported. In general, the groups that completed the entire minicourse made more and larger changes in behavior than the others; and several significant changes occurred in the methods of conducting discussion lessons. (SP 001 962 is a related document.) (JS)

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THE EFFECTS OF VIDEOTAPE FEEDBACK AND MICROTEACHING IN A TEACHER TRAINING MODEL

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INTRODUCTION

Since March, 1967, the primary program of the Far West Laboratory for Educational Research and Development has been aimed at developing and testing the minicourse instructional model as a tool for changing the classroom behavior of teachers. The minicourse model was initially based upon the microteaching technique used at Stanford University in the training of teacher interns. Microteaching as developed at Stanford has several characteristics:

1. First, a set of specific teaching skills is studied by the intern.
2. Then, the intern attempts to apply the skills in a short lesson, usually five to ten minutes, with four or five pupils.
3. This lesson is recorded on videotape and immediately after its completion, the intern watches a replay of the lesson.
4. During the replay a specially trained supervisor gives the intern specific feedback on his performance in the skills.
5. The intern then replans the lesson and reteaches it to another group of four or five pupils.

The minicourse model differs from the Stanford intern model in several ways which generally reflect the different situation found in a university preservice program as opposed to an inservice program that may be offered in any school district. One major difference is that the minicourse model provides a self-contained package of inservice training materials that can be used in any school where a videotape recording system is available. The second

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major difference is that while the Stanford Intern Program employs feedback from trained supervisors, the minicourse program attempts to provide feedback through carefully structured teacher self-evaluation of televised lesson replays. The minicourse also relies heavily upon filmed illustrations by model teachers rather than supervisory feedback to provide the trainee with a basis for discriminating the behavior patterns or skills to be learned. Some research evidence raises serious doubts about the value of supervisory feedback. Acheson (1964), in a study of 60 teaching interns at Stanford, found that television feedback with a supervisor conference was no more effective than television feedback without a supervisor conference. Furthermore, a supervisor conference without television feedback did not produce greater behavior changes than occurred with a control group which received neither television feedback nor conference. In a study of the effects of student versus supervisor feedback on teaching methods, Tuckman and Oliver (1968) found that supervisor feedback resulted in a negative shift in teacher behavior, i.e., away from the direction suggested by the supervisor.

On the other hand, evidence on the use of television replays as a source of feedback, such as Acheson's (1964) study, is generally positive. Orme's (1966) study of perceptual modeling versus symbolic modeling is also pertinent to the minicourse instructional model. In symbolic modeling the subject was told what to do while in perceptual modeling, he was shown a filmed model who portrayed the desired behavior. Perceptual modeling consistently brought about greater changes in the behavior of teaching interns than symbolic modeling. Using models in place of supervisory feedback also has the practical advantage of making it possible for the minicourse to be developed as a complete self-contained package which requires no special skills to administer.

THE PROBLEM

The major goals of this study were to estimate the degree to which (1) practice in the microteaching format (i.e., short lessons and few pupils) and (2) feedback from the videotape replay influenced learning in the minicourse model. A third goal was to determine the effectiveness of the minicourse as a technique for changing the behavior of student teachers.

The specific hypotheses formulated from these goals that were tested in this study are:

1. Student teachers completing the entire Minicourse 1 will display a greater number of significant changes in the teaching behaviors covered in Minicourse 1 than a similar group which receives the entire course except for practice in the microteaching format and VTR feedback.
2. Student teachers completing the entire Minicourse 1 sequence will display a greater number of significant changes in the teaching behavior covered in Minicourse 1 than student teachers who complete Minicourse 1 without VTR feedback.
3. Student teachers taking the minicourse in conjunction with student teaching will make a greater number of significant changes in the teaching behaviors covered in Minicourse 1 than similar subjects taking student teaching without the minicourse.

The microteaching format appears to have some advantages over practice in the whole class situation. Bush and Allen (1964) suggests that microteaching permits the teacher to practice new skills and try new ideas in a less difficult situation than the regular classroom. This reduces the likli-hood of failure and the threat to the teacher that is implicit in trying new

approaches. Research evidence indicates that skills learned in the microteaching format transfer to a significant degree to the teacher's behavior in his regular classroom (Borg, et. al., 1968) and persist with little or no regression for a period of several months (Borg, et. al., 1968b). There is also some evidence (Kallenbach and Gall, 1968; Allen and Fortune, 1966) to indicate that microteaching achieves changes in teacher behavior much more rapidly than student teaching or intern teaching.

Available research evidence would suggest that the role of videotape feedback might be a major factor in the success of the minicourse model. This feedback is focused upon the specific skills that the teacher is trying to master. The videotape replay is viewed by the teacher within a few minutes after he completes the lesson, thus providing him with almost immediate information on his performance. However, although the videotape replay appears to be an important factor in the minicourse model, there is no direct evidence on the amount it contributes to the behavioral changes brought about by this model. Since many schools do not have access to a videotape recording system, it is important to learn whether the minicourse model can bring about significant behavior changes when used without the videotape recorder (VTR).

PROCEDURE

Developing Minicourse 1

The development cycle employed at the Laboratory calls for three field tests of each minicourse, each followed by a revision based on field test information. The preliminary inservice form of Minicourse 1 was developed in the Spring of 1967 and field tested in July of that year. In the Laboratory's R and D cycle, the purpose of the preliminary field test is to get

qualitative feedback from Laboratory personnel who conduct the test and from participating teachers. Based on the results of this field test, the course was revised and a main field test was conducted in October. This test was designed to determine if the minicourse brought about significant changes in the skills and behaviors covered in the course. The performance of the 48 participating teachers was videotaped in 20-minute pre-course and post-course lessons recorded under essentially the same conditions. The tapes were then assigned randomly to trained raters who replayed the tapes and scored them on the behaviors taught in the course. Raters were not regular Laboratory employees, had no stake in the success or failure of the program, and did not know whether any given tape was made before or after the course. Main field test results on the inservice teacher sample were reported in a previous paper (Borg, et. al., 1968). Briefly, it was found that of the thirteen scores obtained from the pre-course and post-course tapes, eleven showed statistically significant gains. Some of the gains were not only statistically significant, but were large enough to suggest a major change in the way the participating teachers conducted their discussion lessons. For example, the average percentage of teacher talk during class discussion changed from 51.64% on the pre-course tapes to 27.75% on the post-course tapes.

Minor revisions were made after the main field test and a final inservice field test was conducted February, 1968 to determine whether the course could be conducted by school personnel with a minimum of Laboratory help, i.e., was it ready for operational use? The operational field test was successful, and only minor revisions were required before the course was made available to the schools for operational use in April, 1968.

The operational test form of Minicourse 1 was adapted for preservice use in the study reported in this paper.

The Treatment

Minicourse 1 was initially developed as an inservice course for teachers in grades 4, 5 and 6. The goal of the course is to change 12 specific classroom behaviors related to the teacher's method of conducting a discussion lesson. These 12 behaviors are organized into 4 instructional sequences. The objective of each instructional sequence and the three behaviors covered in each are given in Table 1. An instructional sequence in Minicourse 1 requires three 75-minute periods to complete. These periods were scheduled daily in this study, but may be scheduled 3 days per week. During the first period, the student teacher taking the course started by watching the instructional lesson a 20 to 30 minute motion picture. In this film three behaviors are described by a narrator and illustrated with film clips which show teachers using the behaviors. A rationale for using each behavior is also given although this is treated in more depth in a handbook given the student teacher at the start of the course. Immediately after watching the instructional film, the student teacher watched a model film in which a model teacher illustrates all three of the behaviors in a microteaching situation, i.e., a lesson 5 to 10 minutes long involving 4 to 8 pupils. On the first showing of the model lesson, the student teacher was asked to identify each of the three behaviors on a checklist as it occurred. A second form of the model lesson is then shown in which the narrator named each behavior as it occurred so that student teacher could check his ability to recognize the behaviors. After viewing the model film the student teacher was given instructions for preparing a short dis-

cussion lesson in which he could practice the three behaviors described in the instructional and model films.

During the second period in the instructional sequence the student teacher took 4 - 8 pupils from his assigned class to the microteaching room, started the videotape recorder and taught the lesson he had planned. When he had finished teaching he sent the pupils back to the regular classroom and replayed twice the videotape recording of his lesson. For each of these replays, an observation form was provided which focuses the student teacher's attention on the three specific behaviors he was instructed to practice. After viewing the replays of his lesson the student teacher was instructed to replan the same lesson so as to make more effective use of the behaviors practiced.

At the start of the third session, the student teacher again went to the microteaching room and taught his revised lesson to a different group of pupils from his assigned class. The lesson was again recorded on videotape which the student teacher replayed twice, each time using a different observation form that he focuses on a specific teaching behavior.

Having completed the first instructional sequence, he was then ready to proceed to the next sequence in which he followed the same pattern of viewing instructional and model films, microteaching and replaying a lesson, replanning the lesson, and reteaching and replaying the revised lesson.

Subjects

In this study, student teachers from three teacher training institutions were employed as subjects. In College A, 17 student teachers completed the entire Minicourse 1 (Group A-1). A second group of 16 student teachers (Group A-2) were given the course handbook, shown the instructional and model

films, and were instructed to practice the behaviors in their regular student teaching classrooms. This group did not practice in a microteaching situation and did not view videotape replays of their performance.

In College B, 15 student teachers completed the entire Minicourse 1 (Group B-1). A group of 17 student teachers were given the entire course except for the videotape recording and replay (Group B-2). This group received the handbook, was shown the instructional and model lessons, and practiced in a microteaching situation. They also evaluated their microteaching lessons but since they did not view themselves on videotape, the evaluation forms developed for this group were less specific.

In College C, a group of student teachers taking Minicourse 1 were to be compared with a control group which received regular student teaching only. However, a sufficient number of student teachers could not be assigned to the two treatments so it was decided to collect pre and post-course videotapes on the control group only, and employ this as a comparison group for the other two colleges (Group C-1).

In Colleges A and B student teachers scheduled to teach in grades 4, 5 and 6 could not be assigned to the treatments in a completely random fashion. In College A, those student teachers participated who had been enrolled with four college supervisors. Student teachers were assigned arbitrarily to supervisors. Which treatment the student teacher received was determined by the school to which he was assigned for student teaching - another arbitrary administrative decision.

College B student teachers had received their student teaching assignments before arrangements were made to participate in the study. Student teachers in schools which had 4 student teachers assigned to grades 4, 5 or 6 were

placed in Group B-1. Student teachers in schools which had 2 or 3 teachers assigned to grades 4, 5 or 6 were placed in Group B-2. This decision was made to get maximum use out of the video equipment, since up to four teachers in a given school can use the same set of equipment. No variables that would bias the assignment of student teachers to the treatments appeared to be operating in either college. In College C, all student teachers assigned to 5 elementary schools were assigned to the comparison group. Again, no apparent bias was operating in this selection.

The dependent variable in this study was the subject's performance on two 16-minute videotapes recorded in a regular classroom with the student teacher's entire class; one immediately before and one immediately after the experimental treatment. A week before the pre-course tape was recorded and again before the post-course tape was recorded, subjects were given instructions on "How to prepare their discussion lessons for videotape recording." During the recording the camera was placed in the class in a position that would provide a good view of the student teachers and pick up at least half of the pupils. Four microphones were positioned around the classroom. At College A the videotape recorder, monitor and operator were positioned outside of the classroom, while in College B they were positioned at the rear of the room. The student teachers were given a brief warm-up period before the recording was started.

There seems little doubt that the presence of the camera and microphones changes the classroom situation. In this study an effort was made to minimize this influence and hold it constant for all subjects. Other alternatives, such as using a hidden camera or leaving the camera in the room for several days and recording on a time sampling basis, were considered, but could not be used because of limitations in the equipment and classrooms that were available.

After the experimental treatment, the pre-course and post-course tapes were coded and assigned randomly to trained raters. Raters were trained to reliably score two or three specific behaviors at a time. During the training sessions, a very precise operational definition of each behavior was developed and decisions were made on the scoring of borderline cases. These behaviors were then scored on the same five tapes by all raters. Scoring was highly objective, consisting of counting the number of times each behavior occurred. A table was then constructed for each behavior to indicate the score of each rater on each tape. If a rater's score on a given tape differed more than 10% from the mean score of all raters, he was given further training and re-scored the tape. Two raters, whose scores continued to disagree with other raters were dropped from the project.

Once the initial five tapes had been scored, the remaining tapes were assigned randomly to the raters. When all tapes were scored for the first set of behaviors, raters were trained to score the next set. This cycle was repeated until all tapes had been scored for all behaviors.

Results

One of the twelve behaviors covered in the course, "calling on both volunteers and nonvolunteers" was found to be unscorable. In many classrooms it was not possible to position the camera so all pupils were in camera range, and it was necessary to see the pupil in order to determine whether or not he had volunteered. Two other behaviors, "dealing with incorrect answers in an accepting, non-punitive manner," and "refocusing the pupils response" were not scored because the inservice field test tapes previously scored showed virtually no variation in these behaviors. Teachers

almost never used a punitive manner in dealing with incorrect answers; perhaps because of the presence of the video camera. Refocusing also appeared so rarely in either pre-course or post-course tapes that scoring did not appear worth the equipment and rater time involved.

A total of 11 scores were obtained from each tape. Scores were obtained on nine of the behaviors listed in Table 1, and in the case of one of these, "framing questions that call for longer pupil responses," two scores were obtained. The percentage of teacher talk was obtained by timing pupil and teacher talk with a stop watch. Although not one of the specific behaviors taught, this percentage is an important variable in class discussion and relates to one of the course objectives.

Table 2 gives the pre-course and post-course mean scores for the five groups as well as t ratios between pre and post tape scores for each group. The one-tailed test and the .05 confidence interval were applied in testing the hypotheses.

The reader will recall that Groups A-1 and B-1 were given the entire Minicourse 1; Group A-2 received the entire course except microteaching and videotape feedback, Group B-2 received the entire course except videotape feedback, and Group C-1 received none of the minicourse materials. All subjects were enrolled in student teaching.

The first behavior that Minicourse 1 attempts to change is the length of the student teacher's pause between framing her question and calling upon a pupil to respond. The course attempts to train teachers to pause from three to five seconds after asking a question and before calling on a pupil. The rationale for this behavior is that such a pause gives pupils more time to frame a thoughtful response to the question. Also, since a pupil's name

is not called until after the pause, there is some pressure on all pupils to plan a response in case they are called on. In contrast, calling the pupil's name before or immediately after framing the question immediately notifies other pupils that they are not going to be called upon to respond so they are under no pressure to think through an answer. Of the five groups, only Group B-1 made a significant increase in the average length of this pause.

The course also attempts to increase the number of times student teachers use redirection in the class discussion situation. Redirection is the technique of framing questions in such a way that the question can be directed to several pupils rather than to a single pupil. The teacher asks the question and redirects it to a number of pupils, each of whom contributes to a complete answer. Redirection has the advantage of increasing pupil participation and often leads to direct interaction among pupils in the discussion situation. All groups except C-1 made some improvement in redirection with this improvement reaching statistical significance for groups A-2 and B-1.

Another objective of the course was to train student teachers to ask questions that call for longer pupil responses and to ask fewer questions that can be answered yes or no or with a single word. A word count of pupil responses was made on each tape to determine the average length. It will be noted that the average length of pupil replies on the pre-tapes ranged from about six to seven and a half words. Virtually no change occurred for Group A-2 and Group C between pre and post-tapes. However, significant gains bringing the average length of the pupil reply beyond 10 words were made by Groups A-1, B-1 and B-2. These data are supported by previous research on inservice teacher training in which the average length of pupil response was found to increase from 5.63 words to 11.78 words for inservice teachers who

were given the complete Minicourse 1 (Borg, et. al., 1968). The number of one-word replies was also tallied for five-minute samples of the pre-course and post-course tapes. Groups B-1, B-2 and C all made significant reductions on this variable.

The course also attempted to train student teachers to ask questions that required pupils to use higher cognitive processes in framing their replies. All teacher questions were classified as either fact questions, higher cognitive questions, or procedural questions. The percentages given in Table 2 indicate the proportion of higher cognitive questions to the total of higher cognitive and fact questions combined. It will be noted that there are no significant gains in the percentage of higher cognitive questions and, in fact, a significant loss occurred for Group A-1. In re-examining Group A-1 tapes, it appears that this loss is largely an artifact of the system used for classifying questions. Several student teachers in this group asked questions which called for opinions rather than higher cognitive processes. These were classified as higher cognitive questions, however, on the classification system used. For example, a question such as "How did you like this poem?" is technically an evaluation question although such questions usually elicit replies that do not appear to call for higher cognitive processes. The experienced teachers in the previous inservice sample made less extensive use of opinion questions so that the very simple classification system used seemed adequate. However, in a similar study using teacher interns, Claus (1968) found it necessary to set up a separate questioning category for opinion questions which she included along with fact questions and labeled as lower order. Since funds were not available to rescore higher cognitive questions, it will be necessary to await the results of further research

before drawing conclusions about the effectiveness of the course in this area. However, it seems doubtful that the course brought about large increases in the use of higher cognitive questions since such increases would probably show up in spite of the confounding brought about by inclusion of opinion questions in the higher cognitive category.

Two probing techniques that teachers can use after the pupil's initial response to a question in order to lead the pupil to a more adequate reply are covered in Minicourse 1. These are prompting, in which the teacher gives the pupil clues or follows up his initial response with leading questions and further clarification, in which the teacher attempts to get the pupil to clarify, elaborate or explain his initial response. It may be seen in Table 2 that no significant increases in prompting occurred. Student teachers in the two groups that were given the entire course, i.e., Groups A-1 and B-1, made significant gains in their use of further clarification.

Minicourse 1 also attempts to reduce or eliminate the teacher's use of three negative behaviors. These behaviors are repeating the question, repeating the pupil's answer, and answering one's own question. Many experienced teachers habitually repeat nearly all of their questions. For example, in the inservice sample previously studied, teachers with an average of nine years experience repeated their questions nearly 14 times in a 20-minute discussion lesson. In contrast, it will be noted that the average teacher in preservice training repeated questions five times or less in a 15-minute discussion lesson. Repeating one's questions is considered an undesirable behavior because it takes up valuable discussion time. Also, when used habitually, it conditions pupils not to listen to the first statement of the question. However, there are certainly situations in the typical lesson

where it is desirable for the teacher to repeat a question. Since few of the subjects involved in the current research habitually repeated their questions, their behavior for the most part was at an acceptable level prior to the experimental treatment. Two groups, B-2 and C showed significant decreases in this behavior. For Group C this decrease must be attributed to their intervening experience in student teaching. This was probably the main factor operating with Group B-2 as well.

The disadvantages of the teacher answering his or her own questions are obvious. If carried to the extreme, this behavior results in the teacher giving a monologue rather than conducting a discussion lesson. In any case, it deprives pupils of the chance to participate in the discussion and increases the proportion of discussion time taken up with teacher talk. Data from our inservice sample indicated that few teachers answer their own questions with high frequency. This finding was supported in the preservice groups studied where the highest average frequency was 3 repetitions during a 15-minute lesson. However, in spite of the low initial level of this behavior, significant reductions occurred in Groups A-1, A-2 and B-2.

Many teachers in the inservice study were found to repeat automatically all or most pupil answers. To be classified as a repetition in this study, the teacher had to repeat the pupil's answer nearly verbatim adding no new ideas and making no major changes in the words used. Thus, restatement, elaboration or clarification of the pupil's answer was not classified as a repetition. It may be seen in Table 2 that on the pre-course videotapes, the student teacher groups repeated pupil answers an average of 16 to 23 times in a 15-minute lesson. The frequency of this behavior was reduced significantly in all of the treatment groups. This would suggest that the

minicourse, with or without microteaching and videotape feedback, can bring about significant reductions in the frequency of this behavior. It will be noted that virtually no change occurred in this behavior for Group C-1.

One of the objectives of Minicourse 1 is to reduce the proportion of time during the class discussion when the teacher is talking. Previous studies have shown that teachers talk as much as 70% of the class time, thereby severely restricting the amount of time available for pupil participation (Floyd, 1960; Adams, 1964). Data from the inservice field test of Minicourse 1 revealed that prior to taking the course, teachers talked an average of 52% of the time during a class discussion period (Borg, et. al., 1968). It may be seen in Table 2 that student teachers also talk a consirable proportion of the time during class discussions. All four of the treatment groups dropped significantly in the percentage of teacher talk. In Group C-1 the percentage of teacher talk was also reduced significantly although a magnitude of this reduction was less than found in the treatment groups. This would suggest that the reduction of teacher talk in the four treatment groups was partially attributable to the student teaching experince and partially to the specific instruction of the minicourse.

Summary and Conclusion

It appears that in general the groups that completed the entire minicourse made more and larger changes in behavior than the groups for which some significant element of the course was omitted. In College A, Group A-1 made significant gains in the desired direction on five of the eleven scores as compared with four significant gains for Group A-2. In College B, Group B-1 made significant gains in the desired direction in seven of the eleven scores

as compared with six for Group B-2. In College C, three statistically significant gains were made. These gains, however, were generally smaller than those of the treatment groups; none reaching the .01 level of confidence. Thus, Hypotheses 1 and 2 are supported by the data although the omission of videotape feedback and practice in the microteaching format from the minicourse model resulted in a smaller loss than was expected by the investigators. Hypothesis 3 is also supported by the data since the difference in performance between Groups A-1 and B-1 on one hand and Group C-1 on the other, are fairly large and favor students who completed Minicourse 1.

One surprising outcome of the current study were the somewhat smaller behavioral changes brought about by Minicourse 1 in the preservice setting as compared with those found previously in field testing the course with experienced teachers. For the inservice sample, differences between precourse and post-course means on all eleven scores obtained in the preservice study were statistically significant. The magnitude of the behavioral changes obtained in the inservice study were also much greater with eight of these differences being significant beyond the .001 level (Borg, et. al., 1968).

Interview and questionnaire data obtained from the subjects in the preservice study suggest a number of reasons for the lesser success of the course with these subjects. Probably most significant was the greater demands placed on the preservice teacher as compared with the inservice teacher. Student teachers had a great deal of difficulty carrying out all of the work demanded in the minicourse. Since the course was offered daily, it was necessary for students to do some preparation each evening in order to be ready for the following day's work. This preparation time had to compete with assignments given students in their other classes and with demands made upon them by

their supervising teachers and college student teaching supervisors. In some cases especially at College A, supervising teachers made demands that made it impossible for students in Group A-1 to carry out parts of the minicourse sequence. For example, a number of students were unable to complete all of their practice sessions in the microteaching setting because teachers would not release them at the scheduled time from their duties in the classroom. This experience suggests that in the preservice setting, the course should be offered either on a 2 or 3 day per week basis rather than daily. Supervising teachers and other persons having control over the student teacher's time should be very thoroughly briefed on the nature of the minicourse program and the importance of completing all of the required activities.

A final conclusion might be that in spite of a number of mistakes made in conducting Minicourse 1 in the two colleges, several significant changes occurred in the methods of questioning and conducting discussion lessons used by the participating student teachers. Thus, the minicourse model, along with other instructional models that employ microteaching, modeling and videotape feedback, continues to show promise as a tool for developing specific teacher skills and behavior patterns.

TABLE 1

OBJECTIVES AND BEHAVIORS FOR EACH INSTRUCTIONAL SEQUENCE IN MINICOURSE 1

Instructional Sequence I:

Objective: To change teacher behaviors that will increase the pupil's readiness to respond to discussion questions.

Specific behaviors covered:
A. Ask question, pause 5 seconds, then call on pupil.
B. Deal with incorrect answers in an accepting, nonpunitive manner.
C. Call on both volunteers and non-volunteers.

Instructional Sequence II:

Objective: To change teacher behavior so as to decrease teacher participation and raise the level and amount of pupil participation.

Specific behaviors covered:
A. Redirection - directing the same question to several pupils.
B. Framing questions that call for longer pupil responses and preclude one word replies.
C. Framing questions that require the pupil to use higher cognitive processes.

Instructional Sequence III:

Objective: To increase the teacher's use of probing behaviors in order to guide the pupil to more complete and thoughtful responses.

Specific behaviors covered:
A. Prompting.
B. Seeking further clarification and pupil insight.
C. Refocusing the pupil's response.

Instructional Sequence IV:

Objective: To reduce the frequency of teacher behaviors that interfere with the flow of the discussion.

Specific behaviors covered:
A. Teacher should not repeat her questions.
B. Teacher should not answer her own questions.
C. Teacher should not repeat pupil answers.

TABLE 2

PERFORMANCE OF STUDENT TEACHER GROUPS ON THE BEHAVIORS COVERED IN MINICOURSE 1

	Group 1 - College A						Group 2 - College B						College C		
	Group A-1 (N=17)			Group A-2 (N=16)			Group B-1 (N=15)			Group B-2 (N=17)			Group C-1 (N=14)		
Skill or Behavior	Pre Course Mean	Post Course Mean	Pre vs Post t	Pre Course Mean	Post Course Mean	Pre vs Post t	Pre Course Mean	Post Course Mean	Pre vs Post t	Pre Course Mean	Post Course Mean	Pre vs Post t	Initial Mean	Final Mean	Pre vs Post t
1. Length of teacher pause in seconds	1.28	1.61	1.50	1.37	1.42	.35	1.58	3.10	2.17	1.53	1.85	1.45	1.69	1.78	.20
2. Number of teacher redirections	23.64	26.52	.80	23.12	30.87	2.12	19.93	31.20	2.73	25.05	31.29	1.24	20.78	20.71	.02
3. Number of words per pupil response	7.35	10.42	1.94	7.58	7.85	.18	6.18	10.13	2.25	6.31	10.73	2.76	6.55	7.43	1.29
4. Number of one word remarks	4.11	3.64	.32	4.31	4.18	.12	5.33	2.40	2.63	5.41	3.47	2.17	5.57	3.64	1.83
5. Percentage of higher cognitive questions	61.48	35.77	2.82	39.88	33.82	1.14	46.40	52.94	.70	44.30	44.06	.04	27.08	26.36	.11
6. Number of teacher prompts	2.70	2.35	.46	1.62	2.31	1.21	1.33	1.86	.82	1.05	1.58	1.26	1.28	1.64	.54
7. Number of times teacher seeks clarification	3.47	8.17	3.48	4.68	3.68	.89	2.40	3.86	1.65	3.70	3.76	.07	2.78	2.57	.27
8. Number of times teacher repeats question	3.00	3.00	00	3.00	2.06	1.08	3.53	2.46	1.28	5.23	2.00	3.67	5.07	3.14	1.91
9. Number of times teacher answers own question	1.23	.58	1.75	2.50	.75	2.43	1.13	1.26	.19	2.11	.64	2.82	3.01	3.00	.00
10. Number of times teacher repeats pupil answer	16.23	9.41	2.18	17.37	8.25	2.60	19.80	7.86	4.89	22.64	6.70	4.66	23.35	23.28	.01
11. Percentage of teacher talk	44.96	35.87	2.48	52.23	39.66	2.36	46.75	30.85	4.00	49.94	30.98	4.52	50.41	44.24	1.91

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